TRAFFIC SPEED REPORT NO. 73
TRUCK WEIGHT-SPEED STUDY

NOVEMBER, 1961

NO. 27

by

K. J. THARP

Joint Highway Research Project

PURDUE UNIVERSITY
LAFAYETTE INDIANA

Progress Report

TRAFFIC SPEED REPORT NO. 73
TRUCK WEIGHT-SPEED STUDY

TO: K. B. Woods, Director
Joint Highway Research Project

November [illegible], 1961

FROM: H. L. Michael, Associate Director
Joint Highway Research Project

File: [illegible]
Project: C-36-10D

Attached is Traffic Speed Report No. 73 which is the 1961 Truck Weight-Speed Study. This annual study which is performed in cooperation with the State Highway Planning Survey Unit of the Indiana State Highway Commission was conducted by Mr. A. J. Tharp of our staff.

A summarization of the results of the similar studies made in previous years and the data for 1961 indicates that the trend of both single unit and multi-unit trucks has been one of gradually increasing speeds and weights. The data for 1961 also indicated that the speeds of single unit trucks are dependent upon the weight of the vehicle but that the speeds of multi-unit trucks do not vary with the weight of the vehicle.

Copies of this report will be distributed to the Highway Planning Unit, the Bureau of Public Roads and the Indiana State Police. The report is submitted for the record and for such release

Respectfully submitted,

Harold L. Michael
Secretary

HLM:hm

Attachment

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TRAFFIC SPEED REPORT NO. 73

TRUCK WEIGHT-SPEED STUDY

by

K. J. Tharp

Joint Highway Research Project
File No: 8-3-4
Project No: C-36-10D

Performed in Cooperation

with

The State Highway Planning Survey

Indiana State Highway Commission

August 3, 9, 10, 11, 14, 21, 22, 23, 25, 1961

Purdue University
Lafayette, Indiana

November 8, 1961

TRAFFIC SPEED REPORT NO. 73

TRUCK WEIGHT - SPEED STUDY

Introduction

The seventeenth annual truck weight-speed study was conducted during the month of August 1961 by the Joint Highway Research Project of Purdue University in cooperation with the Highway Planning Survey Unit of the Indiana State Highway Commission. The Highway Planning Survey Unit makes annual studies of truck weights, size, material hauled, etc. at twenty permanent truck-weight stations located throughout the state. The truck-weight speed study matches the weight of a truck, obtained by the Planning Unit with portable loadometer scales, and the observed speed of the same vehicle as recorded at a nearby speed station. This provides the basis for a correlation of truck speeds with truck weights.

Data from nine truck weight stations were used for the truck weight-speed study. These stations are shown on Figure 1 and are further described as follows:

Station	Highway	Location	Date of Obs.	No. of Lanes
45B	S. R. 67	1 mi. S.W. of Muncie	Aug. 3	2
5	U. S. 30	1.3 mi. E. of Bourbon	Aug. 9	2
4	U. S. 31	0.2 mi. S. of U.S. 6	Aug. 10	2
2	U. S. 20	0.3 mi. W. of S. R. 2	Aug. 11	4
14	U. S. 41	0.5 mi. S. of S. R. 2	Aug. 14	4
42	U. S. 52	0.1 mi. S. of S. R. 28	Aug. 21	4
58B	U. S. 31	0.2 mi. S. of Southport Rd.	Aug. 22	4
75	U. S. 41	0.2 mi. S. of U.S. 41 Business Route	Aug. 23	4
81	U. S.150	0.5 mi. E. of S. R. 56	Aug. 25	2

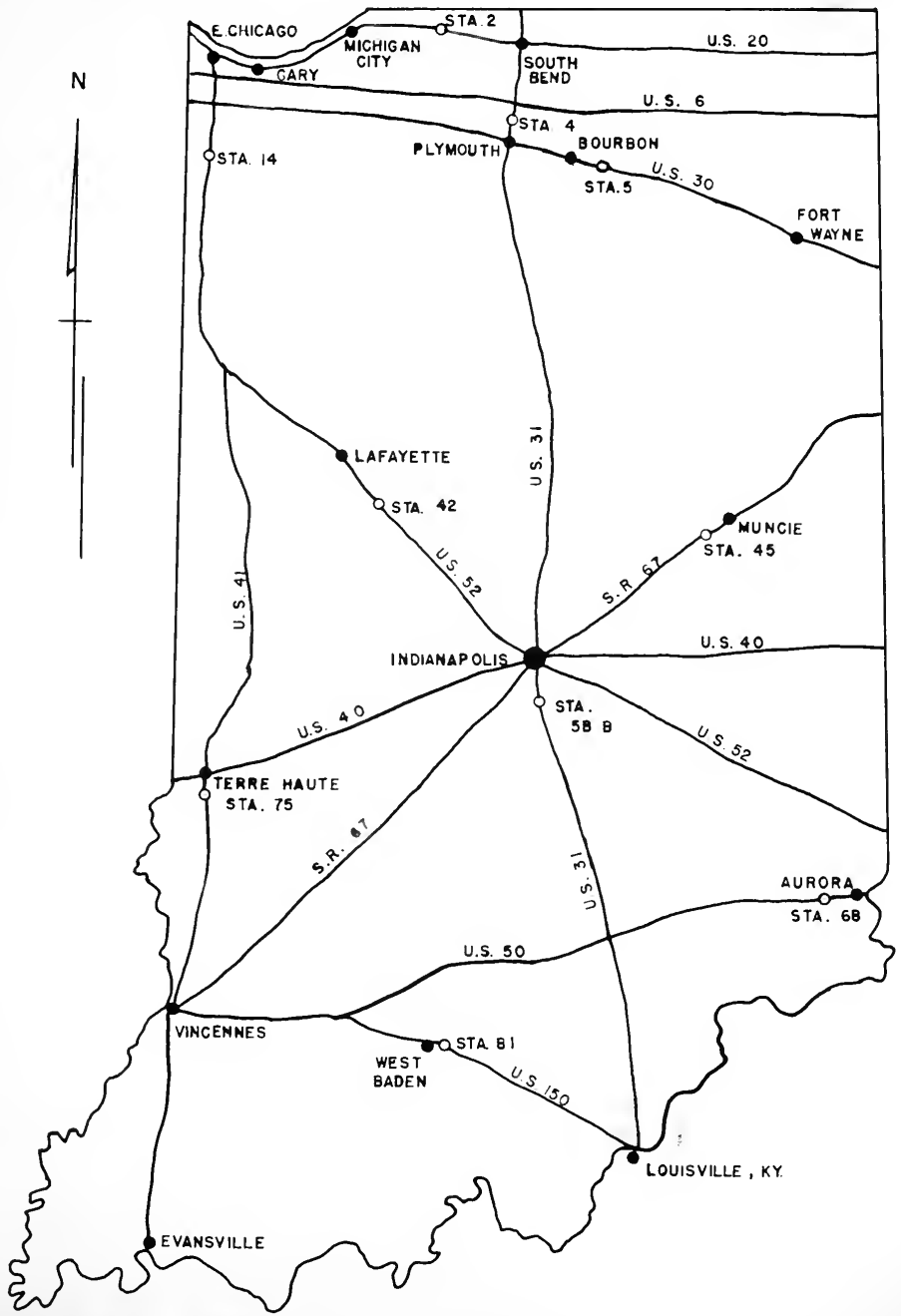

FIG. 1 LOCATIONS OF TRUCK WEIGHT - SPEED STATIONS

The speed observations were made on level, tangent sections of road between one and three miles from the weight station. In all cases, sufficient distance was allowed for the trucks to regain normal cruising speed while minimizing opportunities for the vehicles to turn off the highway.

The speed data was collected by the writer and Mr. Preston Clayton. The analysis was prepared by the writer with the aid of members of the Traffic Engineering Laboratory staff.

Equipment and Field Procedure

The speed observations were made with an ELECTROMATIC Radar Speed Meter reading directly in miles per hour. The radar unit was checked for accuracy prior to field use. Figure 2 shows the adjustments required to correct the radar readings to true speeds. All observations have been revised so that true speeds are presented in this report. While in the field, uniformity of radar readings was verified by frequent checks with a 60-mile per hour tuning fork. At one station, the radar reading was also checked by comparing with a standardized car speedometer.

The radar unit was placed upon a box approximately four feet from the edge of the pavement and was oriented at a small angle with the direction of traffic flow. Concealment of the equipment is not possible upon modern highways having adequate shoulder width. To lessen the effect of driver observation of the speed meter, a car was parked so that on-coming traffic could not see the radar unit in sufficient time to reduce speed. Further deception was accomplished by feigning mechanical malfunction of the car by raising the hood. There was no apparent change in speed as traffic approached the speed station.

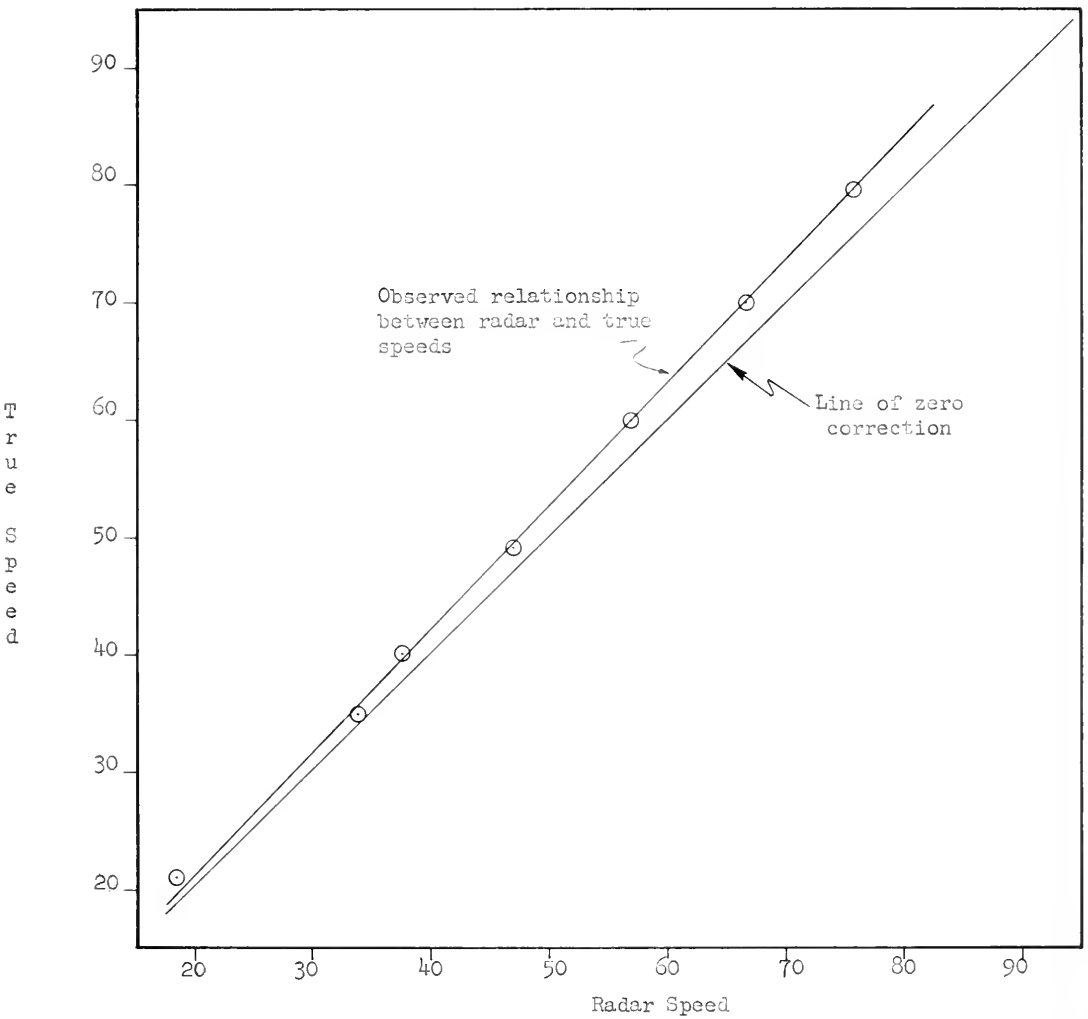

FIGURE 2. CALIBRATION CHART FOR THE ELECTROMATIC RADAR-SPEED METER

For use in this study only normal highway truck speeds were desired. Therefore, observations were made only on "free-flowing" trucks - that is, not hampered by other traffic or by a change in speed resulting from a turn or stop. This limitation caused a considerable reduction in data on low capacity highways.

The speed stations were operated during the same hours as the truck weight station. During the four-hour period 8 a.m. to 12 noon, trucks moving in one direction along the highway were observed. During the afternoon, 12 noon to 4 p.m., observations were made on trucks traveling in the opposite direction.

Procedure of Analysis

For this analysis all trucks are grouped into the general categories of single-unit or multi-unit (semi-trailer) vehicles.

In addition, the single-unit grouping is subdivided by weight into those having a gross weight of 5,000 pounds or more, and those weighing less than 5,000 pounds. This weight classification corresponds to the existing Indiana speed limits for trucks. 65 miles per hour for "light" (less than 5,000 pounds) trucks; 55 miles per hour for "heavy" (5,000 pounds or more) trucks on four-lane highways with a median of 20 feet or more; and 50 miles per hour for heavy trucks on other highways.

Table I provides the speed and weight data of single-unit trucks while Table II presents similar data for multi-unit trucks. In these two tables, the data are also summarized by type of highway (2 or 4 lane), truck weight and totals for each.

Station	ways				Total Four-lane		Total Two-lane and Four-lane	
	58B		75					
Weight(Kip	.	No. of Trucks	Ave. Speed	No. of Trucks	Ave. Speed	No. of Trucks	Ave. Speed	No. of Trucks
0-4		3	49.2	18	49.8	30	48.6	38
4-5		12	50.1	41	50.8	86	49.8	165
Total truc		15		59		116		203
Ave.Wt.(Ki		4012		4200		4227		4293
Ave. Speed		47.6		49.8		50.5		49.6
Conf. Leve		95%		95%		95%		95%
Conf. Limit	Upp	51.2		52.0		52.0		50.7
	Low	44.0		47.6		49.0		48.5
% Empty		80.0		72.8		75.8		77.8
5-8		25	47.2	42	50.3	130	49.2	246
8-12		32	46.3	25	47.7	105	47.0	209
12-16		14	49.7	18	49.7	75	48.1	125
16-20		15	44.1	5	47.8	36	46.6	77
20-24		6	47.5	6	46.6	24	46.5	42
24-28		1	53.1	1	46.2	4	44.4	10
28-32					48.5	2	42.8	4
32-36		1	55.2	1	55.2	2	52.2	3
36-40		3	39.7	1	42.7	7	42.7	7
40-44			42.8	3	44.4	5	44.4	9
44-48		1			43.9	1	41.3	2
48-52								
52-56								
56-60					51.1	1	51.1	1
Total Truc		98		102		392		735
Ave.Wt.(Ki		12,908		11,643		12,422		12,316
Ave. Speed		47.0		47.2		48.7		47.6
Conf. Leve		95%		95%		95%		95%
Conf. Limit	Upp	48.5		48.5		49.4		48.1
	Low	45.5		45.9		48.0		47.1
% Empty		43.9		48.0		43.1		39.7

TABLE I SINGLE-UNIT TRUCK SPEEDS (MPH)

Station	Two-lane Highways										Four-lane Highways												Total Two-lane and Four-lane	
	458		5		4		81		Total Two-lane		2		14		42		58B		75		Total Four-lane			
Weight(Kips)	Ave. Speed	No. of Trucks	Ave. Speed	No. of Trucks	Ave. Speed	No. of Trucks	Ave. Speed	No. of Trucks	Ave. Speed	No. of Trucks	Ave. Speed	No. of Trucks	Ave. Speed	No. of Trucks	Ave. Speed	No. of Trucks	Ave. Speed	No. of Trucks	Ave. Speed	No. of Trucks	Ave. Speed	No. of Trucks	Ave. Speed	No. of Trucks
0-4	35.6	1	0	0	42.3	2	46.5	5	44.1	8	48.5	4	43.9	1	53.4	4	51.8	3	49.2	18	49.8	30	48.6	38
4-5	52.0	17	52.1	8	47.3	29	47.4	25	48.8	79	55.5	8	50.7	10	53.4	15	46.6	12	50.1	41	50.8	86	49.8	165
Total trucks	18		8		31		30		87		12		11		19		15		59		116		203	
Ave.Wt.(lbs.)	4433		4525		4406		4286		4380		4433		4381		4263		4012		4200		4227		4293	
Ave. Speed	51.1		52.1		47.0		47.2		48.4		53.2		50.0		53.4		47.6		49.8		50.5		49.6	
Conf. Level	95%		95%		95%		95%		95%		95%		95%		95%		95%		95%		95%		95%	
Conf. Upper	54.0		55.8		50.1		49.6		50.0		58.8		53.6		56.6		51.2		52.0		52.0		50.7	
Limit Lower	48.2		48.4		43.9		44.8		46.8		47.6		46.4		50.2		44.0		47.6		49.0		48.5	
% Empty	80.3		62.5		80.6		73.3		80.4		83.3		81.8		73.7		80.0		72.8		75.8		77.8	
5-8	49.6	31	49.8	16	46.2	50	47.8	19	47.9	116	52.0	11	51.9	28	54.3	24	49.0	25	47.2	42	50.3	130	49.2	246
8-12	48.9	31	46.2	25	44.3	23	44.8	25	46.2	104	48.4	15	46.0	14	51.0	19	46.0	32	46.3	25	47.7	105	47.0	209
12-16	45.1	16	48.8	10	44.1	10	45.4	8	45.6	50	49.0	10	49.7	13	51.8	20	47.1	14	49.7	18	49.7	75	48.1	125
16-20	48.5	9	47.0	11	43.7	12	43.9	9	45.6	41	47.1	6	51.6	6	50.0	4	47.2	15	44.1	5	47.8	36	46.6	77
20-24	47.8	5	50.5	2	37.3	3	47.0	8	46.3	18	41.3	2	45.9	5	51.5	5	44.0	6	47.5	6	46.0	24	46.5	42
24-28	38.7	1	45.9	2	33.5	1	47.5	2	42.2	6			38.7	1	61.5	1	31.5	1	53.1	1	46.2	4	44.4	10
28-32		--					37.2	2	37.2	2					48.5	2					48.5	2	42.8	4
32-36		--					44.9	1	44.9	1							56.3	1	55.2	1	55.8	2	52.2	3
36-40		--									45.9	2	47.0	1			40.1	3	39.7	1	42.7	7	42.7	7
40-44	47.0	1					43.5	3	44.4	4	46.4	2							42.8	3	44.4	5	44.4	9
44-48		--			38.7	1			38.7	1							43.9	1			43.9	1	41.3	2
48-52		--																						
52-56		--																						
56-60		--											51.1	1							51.1	1	51.1	1
Total Trucks	94		96		106		77		343		48		69		75		98		102		392		735	
Ave.Wt.(lbs.)	11,172		14,612		10,430		13,800		12,146		14,870		12,058		11,616		12,908		11,643		12,422		12,316	
Ave. Speed	48.2		47.8		44.7		45.6		46.4		49.0		49.0		52.5		47.0		47.2		48.7		47.6	
Conf. Level	95%		95%		95%		95%		95%		95%		95%		95%		95%		95%		95%		95%	
Conf. Upper	49.5		49.0		46.0		46.7		47.1		50.7		51.1		53.8		48.5		48.5		49.4		48.1	
Limit Lower	46.9		46.6		43.4		44.5		45.7		47.3		46.9		51.2		45.5		45.9		48.0		47.1	
% Empty	24.4		54.5		34.9		35.1		35.8		35.4		34.8		48.0		43.9		48.0		43.1		39.7	

Stat	ghways						Total Two-lane and Four-lane	
	58B		75		Total Four-lane			
Weig	ve. peed	No.of Trucks	Ave. Speed	No. of Trucks	Ave. Speed	No. of Trucks	Ave. Speed	No. of Trucks
8-12							36.1	2
12-16	5.2	1	53.1	1	52.6	4	50.3	6
16-20	0.8	5	48.2	4	50.2	19	50.0	28
20-24	1.3	11	51.7	12	50.6	67	49.6	99
24-28	9.2	26	50.1	13	50.6	123	49.8	178
28-32	9.6	11	49.9	11	49.2	68	48.6	121
32-36	1.4	8	51.7	5	50.6	51	49.0	88
36-40	4.6	7	48.0	3	51.6	37	51.1	54
40-44	0.9	12	49.0	1	51.4	52	50.1	70
44-48	8.0	9	47.9	4	50.2	31	48.8	52
48-52	7.0	11	53.2	3	49.7	46	48.8	66
52-56	7.5	12	46.8	5	48.9	64	48.5	95
56-60	4.1	8	49.4	6	50.0	58	49.0	89
60-64	7.1	6	48.5	4	50.0	28	48.2	52
64-68	2.8	3	43.4	2	50.0	22	49.0	43
68-72	7.6	3			47.6	19	47.3	34
72-76	5.4	2	51.6	2	48.6	23	47.8	38
76-80					49.3	8	46.0	23
80-84	3.1	1			52.8	4	49.5	10
84-88							45.9	1
88-92								
92-96								
96-100								
Total	136		76		724		1,149	
Ave.	40,269		37,000		41,605		42,595	
Ave.	49.3		49.8		50.1		48.0	
Conf	95%		95%		95%		95%	
Conf	50.3		43.1		50.5		48.9	
Limi	48.3		41.7		49.7		48.3	
% Em	38.2		35.5		35.9		33.4	

TABLE II MULTI-UNIT TRUCK SPEEDS (MPH)

Station	Two-lane Highways										Four-lane Highways												Total Two-lane and Four-lane	
	45B		5		4		81		Total Two-lane		2		14		42		58B		75		Total Four-lane			
Weight (Kips)	Ave. Speed	No. of Trucks	Ave. Speed	No. of Trucks	Ave. Speed	No. of Trucks	Ave. Speed	No. of Trucks	Ave. Speed	No. of Trucks	Ave. Speed	No. of Trucks	Ave. Speed	No. of Trucks	Ave. Speed	No. of Trucks	Ave. Speed	No. of Trucks	Ave. Speed	No. of Trucks	Ave. Speed	No. of Trucks	Ave. Speed	No. of Trucks
8-12		--			36.1	2			36.1	2													36.1	2
12-16		--			49.0	1	42.8	1	45.9	2			51.1	2			55.2	1	53.1	1	52.6	4	50.3	6
16-20	53.4	4	48.0	3	44.9	2			49.7	9	45.2	2	50.8	4	53.1	4	50.8	5	48.2	4	50.2	19	50.0	28
20-24	50.2	7	46.8	12	46.6	10	46.6	3	47.5	32	47.1	11	50.6	18	51.3	15	51.3	11	51.7	12	50.6	67	49.6	99
24-28	49.6	18	46.4	13	47.1	10	48.1	14	48.0	55	49.6	22	51.8	33	51.6	29	49.2	20	50.1	13	50.6	123	49.8	178
28-32	50.4	17	47.0	19	46.8	12	46.3	5	47.9	53	46.5	14	50.0	21	50.2	11	49.6	11	49.9	11	49.2	68	48.6	121
32-36	50.4	9	45.6	17	46.1	10	43.9	1	46.8	37	45.9	9	53.4	14	50.3	15	51.4	8	51.7	5	50.6	51	49.0	88
36-40	53.4	8	44.7	5			49.0	4	49.9	17	43.5	3	51.6	15	53.2	9	54.6	7	48.0	3	51.6	37	51.1	54
40-44	47.8	5	44.6	10	44.9	1	52.1	2	46.3	18	48.3	10	51.4	12	53.2	17	50.9	12	49.0	1	51.4	52	50.1	70
44-48	48.4	6	47.0	10	45.2	4	50.0	1	46.7	21	52.3	5	51.6	12	51.1	1	48.0	9	47.9	4	50.2	31	48.8	52
48-52	50.3	4	46.4	13	44.9	1	44.9	2	46.9	20	40.0	11	51.6	12	50.6	9	47.0	11	53.2	3	49.7	46	48.8	66
52-56	47.3	9	48.6	15	49.0	4	43.2	3	47.7	31	45.2	13	51.2	28	50.9	6	47.5	12	46.8	5	48.9	64	48.5	95
56-60	49.4	9	46.3	14	45.9	3	47.2	5	47.3	31	47.2	12	53.1	21	51.5	11	44.1	8	49.4	6	50.0	58	49.0	89
60-64	51.8	3	45.1	14	46.6	3	44.4	4	46.0	24	50.3	5	52.4	4	51.4	9	47.1	6	48.5	4	50.0	28	48.2	52
64-68	48.5	6	47.7	15					47.9	21	47.4	9	51.4	7	50.0	1	52.8	3	43.4	2	50.0	22	49.0	43
68-72	50.0	2	47.4	9	44.2	3	45.9	1	47.0	15	45.3	7	50.8	4	48.4	5	47.6	3			47.6	19	47.3	34
72-76	48.8	4	44.3	6	42.0	4	48.0	1	46.7	15	48.8	13	50.0	3	46.9	3	45.4	2	51.6	2	48.6	23	47.8	38
76-80	48.0	1	48.5	6	39.4	6	44.9	2	44.3	15	47.7	4	52.1	1	50.4	3					49.3	8	46.0	23
80-84		--	47.3	6					47.3	6			55.2	1	51.5	2	53.1	1			52.8	4	49.5	10
84-88		--	45.9	1					45.9	1													45.9	1
88-92		--																						
92-96		--																						
96-100		--																						
Total Trucks	112		188		76		49		425		150		212		150		136		76		724		1,149	
Ave. Wt. (lbs.)	41,058		48,546		40,705		40,849		44,283		40,546		41,349		40,575		40,269		37,000		41,605		42,595	
Ave. Speed	49.8		46.5		45.7		46.9		47.3		47.9		51.6		51.4		49.3		49.8		50.1		48.6	
Conf. Level	95%		95%		95%		95%		95%		95%		95%		95%		95%		95%		95%		95%	
Conf. Upper Limit	50.7		47.1		47.0		48.0		47.5		48.7		52.3		52.1		50.3		43.1		50.5		48.9	
Conf. Lower Limit	48.9		45.9		44.4		45.8		47.1		47.1		50.9		50.7		48.3		41.7		49.7		48.3	
% Empty	31.2		22.3		35.5		40.8		29.1		28.6		36.8		40.8		38.2		35.5		35.9		33.4	

Summary of Results

From Tables I and II the following observations are made:

Single-unit trucks less than 5,000 lbs.—

	2-lane hwys.	4-lane hwys.	all hwys.
No. of vehicles observed	87	116	203
Average speed (mph)	48.4	50.5	49.6
Average weight (lbs.)	4380	4227	4293

Single-unit trucks over 5,000 lbs.—

No. of vehicles observed	343	392	735
Average speed (mph)	46.4	48.7	47.6
Average weight (lbs.)	12,196	12,422	12,316

Multiple-units (semi-trailers) —

No. of vehicles observed	425	724	1,149
Average speed (mph)	47.3	50.1	48.6
Average weights (lbs.)	44,283	41,605	42,595

Table III reveals that 2% of the light trucks exceeded the legal 65 mph speed limit and only 1% exceeded the "enforceable" speed limit of 70 mph. On two lane highways, slightly over 23% of heavy trucks and semi-trailers exceeded the legal speed limit of 50 mph. The percentage exceeding the enforceable speed limit (55 mph) was 8½% for heavy single-units and nearly 5% for semis. On four-lane highways, approximately 17% of the heavy trucks and 19½% of the semis exceeded the legal 55 mph speed limit. On this type of highway only 5½% of the heavy trucks and 2½% of the semis traveled faster than the 60 mph "enforceable" speed.

A comparison of average speeds and weights for the last 14 years is presented in Table IV. The average speed of single-unit trucks has shown a tendency to increase since 1948. During the last

TABLE III

PERCENT OF TRUCKS VIOLATING SPEED LIMITS

		Trucks Weighing Under 5000 lbs			Trucks Weighing Over 5000 lbs			Multiple Units		
	Station	No. Noted	% Exceed 65 MPH	% Exceeding 70 MPH	No. Noted	% Exceeding 55 MPH	% Exceeding 60 MPH	No. noted	% Exceeding 55 MPH	% Exceeding 65 MPH
Two-Lane Highways	45-B	18	0	0	94	33.0	16.0	112	44.6	13.4
	5	8	[illegible]	0	63	24.0	[illegible]	188	16.0	1.1
	4	31	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.6
	81	30	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.0
		87	[illegible]	0	248	[illegible]	[illegible]	[illegible]	[illegible]	4.7
					% Exceeding 55 MPH	% Exceeding 60 MPH			% Exceeding 55 MPH	% Exceeding 60 MPH
Four-Lane Highways	2	12	16.6	[illegible]	[illegible]	14.6	[illegible]	150	11.3	0.7
	14	11	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	26.0	4.7
	42	19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	12	1.3
	58-B	15	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.7
	75	59	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.3
		116	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Summary	203	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Year	1948			1957					1956	1958	1959	1960	1961
Number of Single-Unit Trucks	493								952	1028	837	481	424	938
Average Speed of Single-Unit Trucks	42.4												45.1	48.0
Average Weight of Single-Unit Trucks	8,200	9,400	8,700									9,230	12,000	10,600
Number of Multiple-Unit Trucks	627	580	879									606	644	
Average Speed of Multi-Unit Trucks	42.7											48.6	50.3	48.6
Average Weight of Multi-Unit Trucks	31,900													

five years, the average weights have also apparently increased from less than 9,000 lbs. to above 10,000 lbs. The average speed and weight of multi-unit trucks have also increased considerably during this period of time. Semi-trailer weights appear to have a fairly constant upward trend. Figures 8 and 9 portray graphically the apparent upward trend in the 85th percentile speed.

The cumulative frequency distribution curves indicate that multi-unit trucks travel with less speed variation between drivers than the single-unit vehicles. This is disclosed by the steepness of the central portion of the frequency curve and the narrower speed differential between the 15th and 85th percentile. The group exhibiting the greatest variability in speeds is the light single-unit trucks.

A plot of average truck speed versus truck weights produced the diagrams of Figures 6 and 7. The points plotted are average speed for a weight classification, while the lines are derived from individual speeds as observed in the field. For single-unit trucks on both two- and four-lane highways, the slope of the plotted line is significantly different from zero, thus indicating that the speed varies somewhat with the vehicle weight. The slope of the line for multi-unit vehicles is not significantly different from zero thereby indicating no evidence of a relationship between truck weight and truck speed for this group.

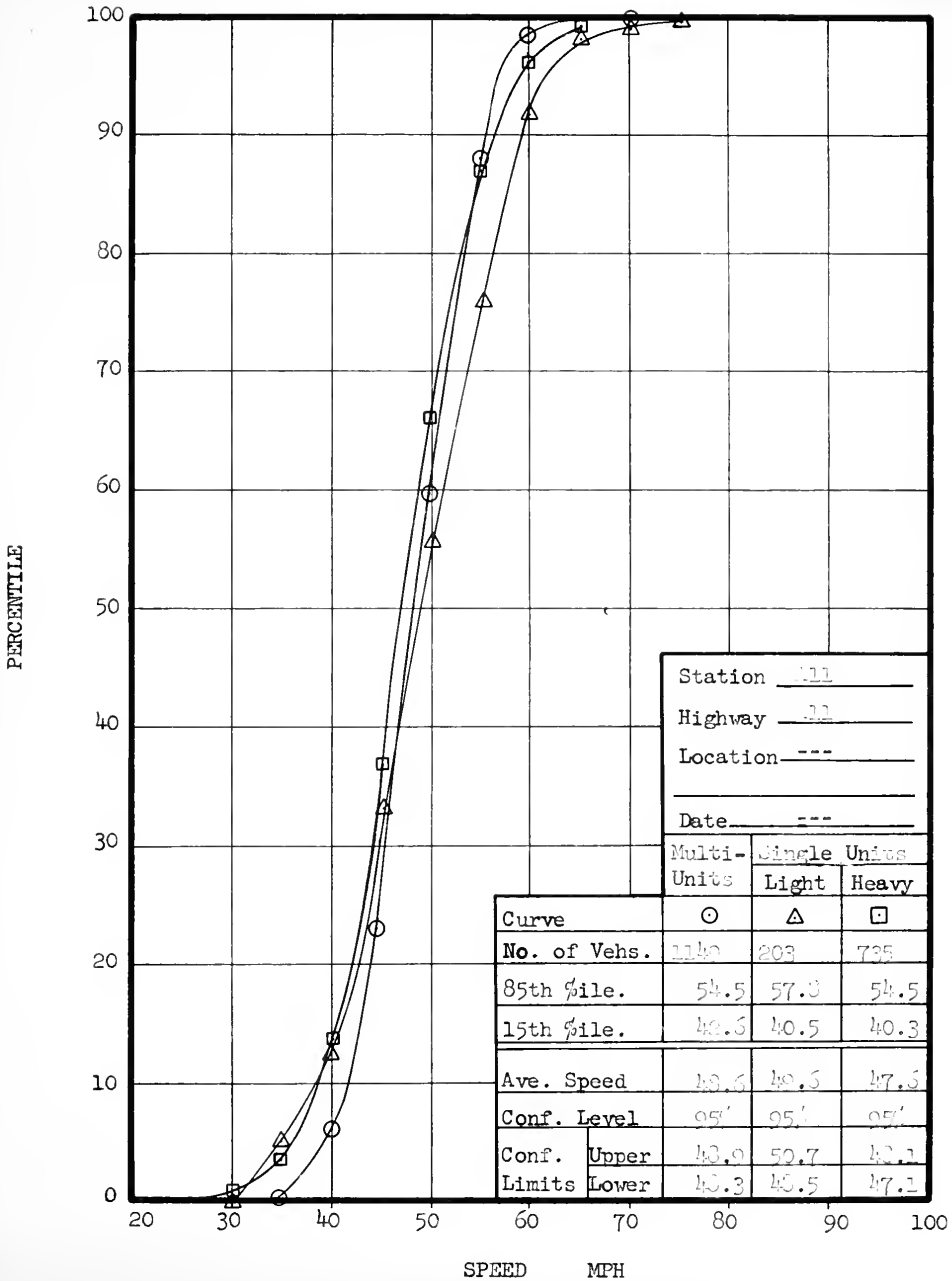

FIGURE 3. CULULATIVE FRE U.NCY CURVES FOR ALL HIGHWAYS

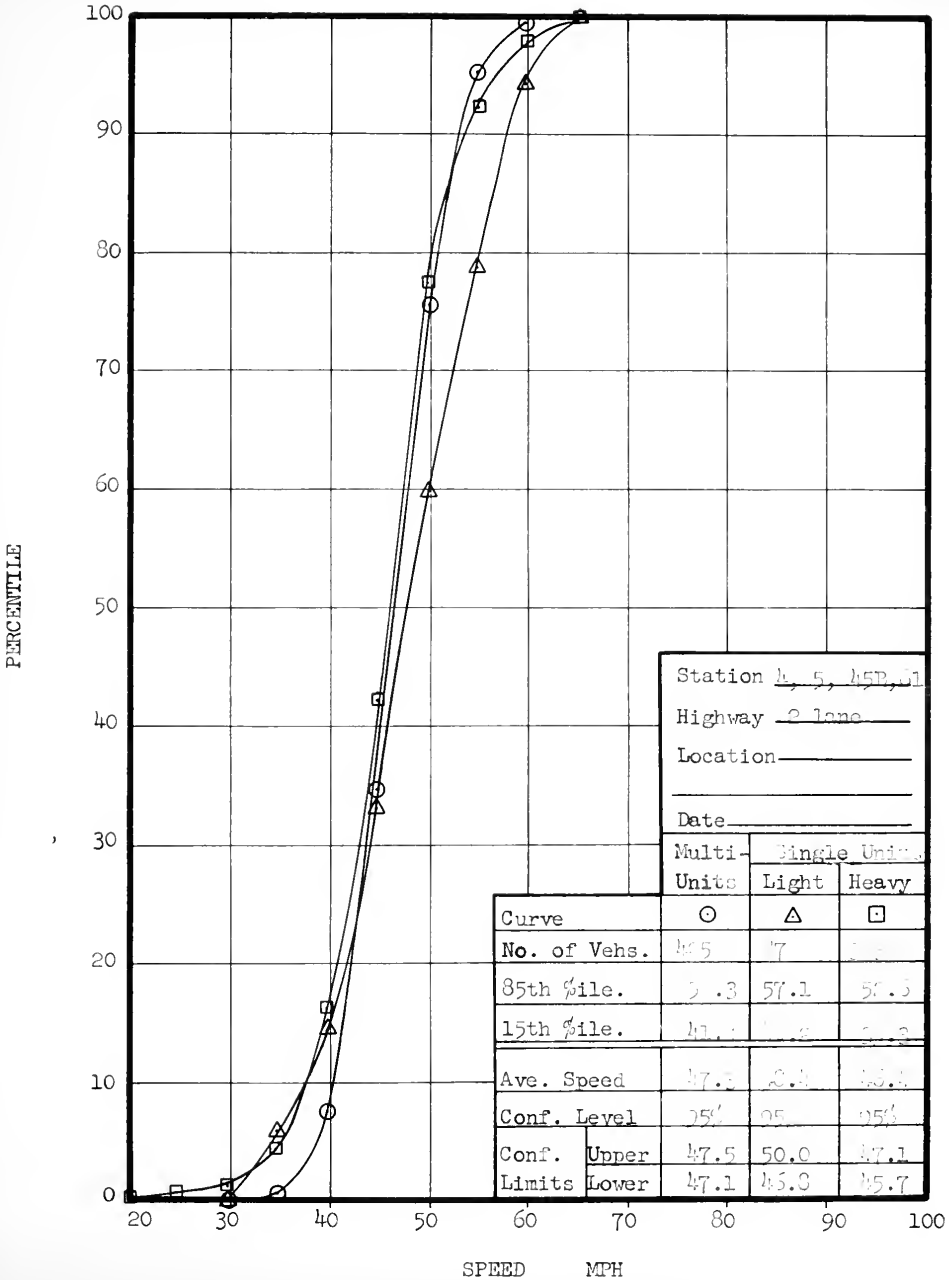

FIGURE 4. CUMULATIVE FREQUENCY CURVES FOR TWO-LANE HIGHWAYS

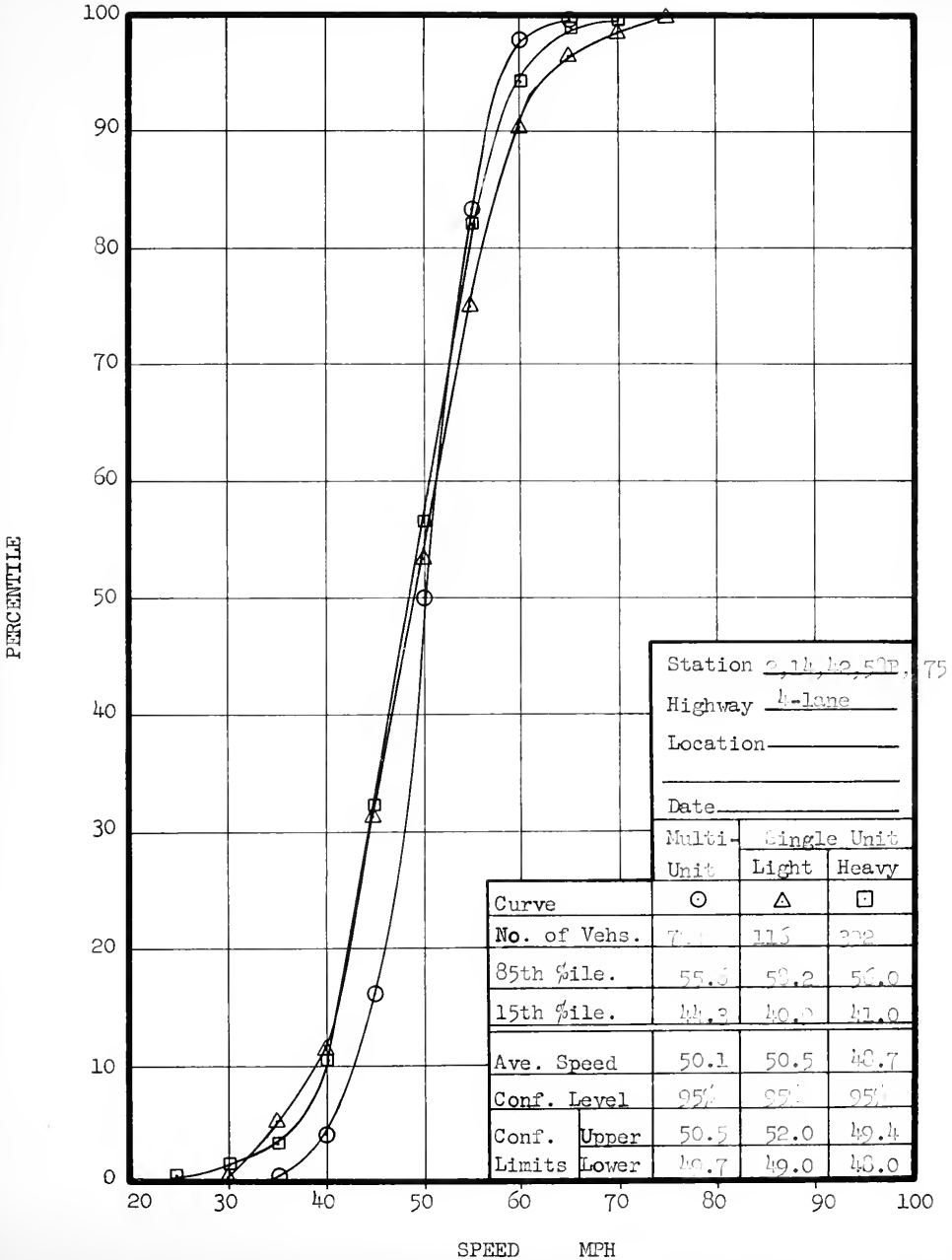

FIGURE 5. CUMULATIVE FREQUENCY CURVES FOR FOUR-LANE HIGHWAYS

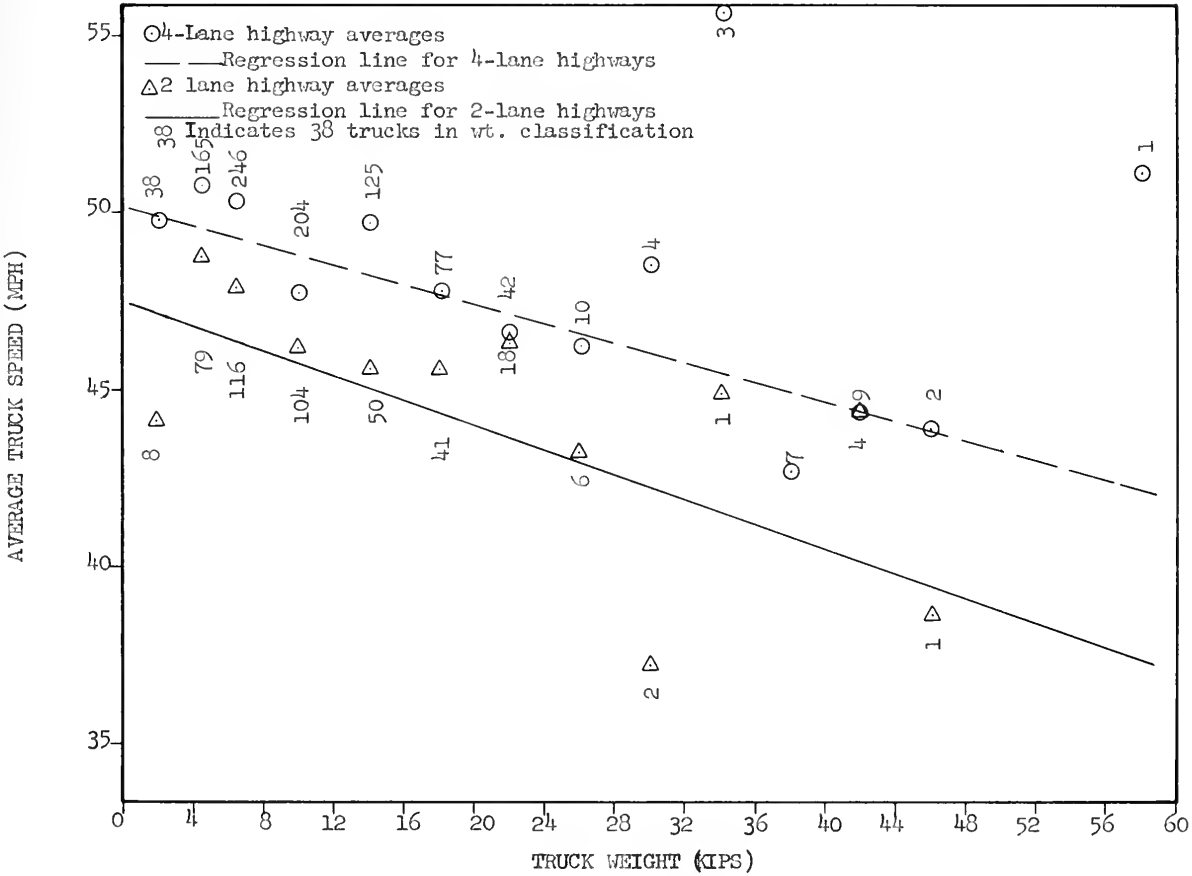

FIGURE 6. AVERAGE TRUCK SPEED FOR
TRUCK WEIGHT CLASSIFICATION (SINGLE-UNITS)

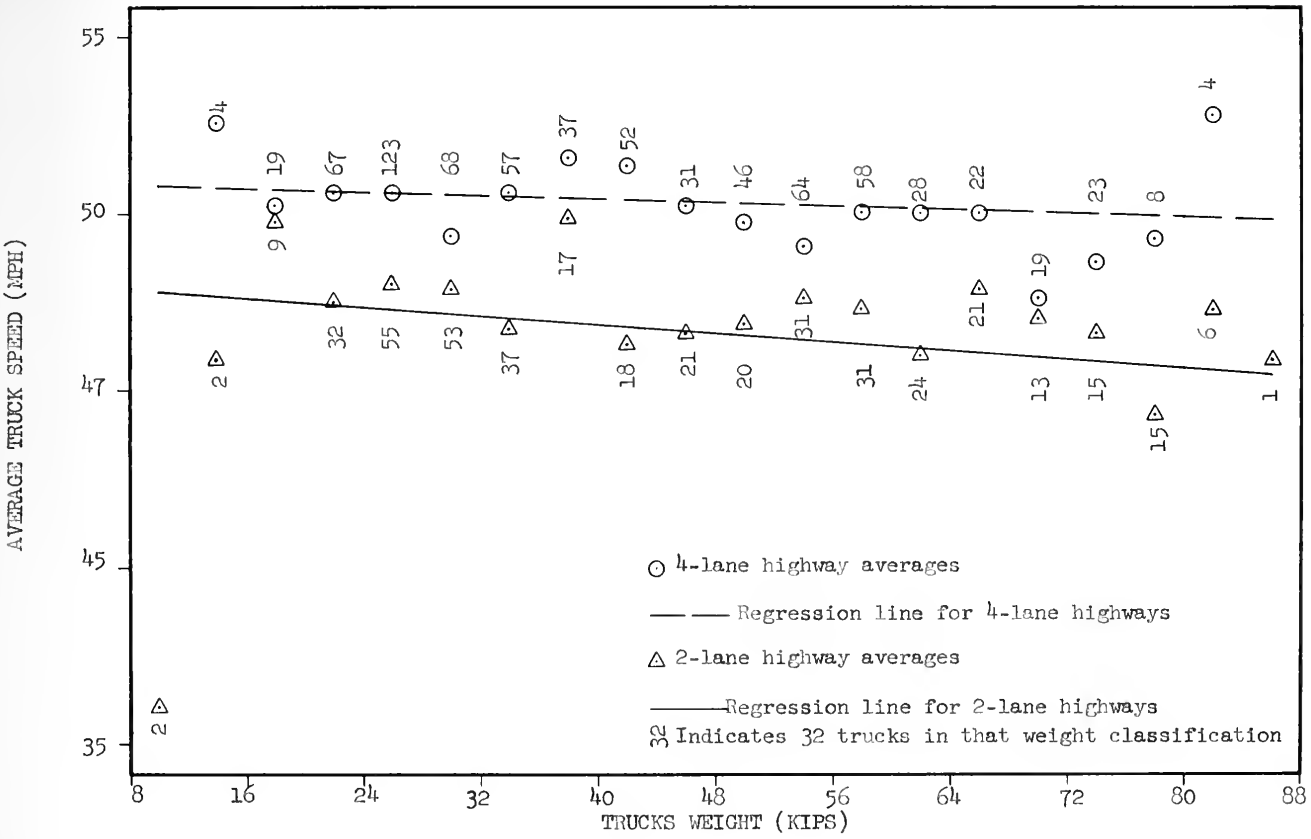

FIGURE 7. AVERAGE TRUCK SPEED FOR
TRUCK WEIGHT CLASSIFICATION (MULTI-UNITS)

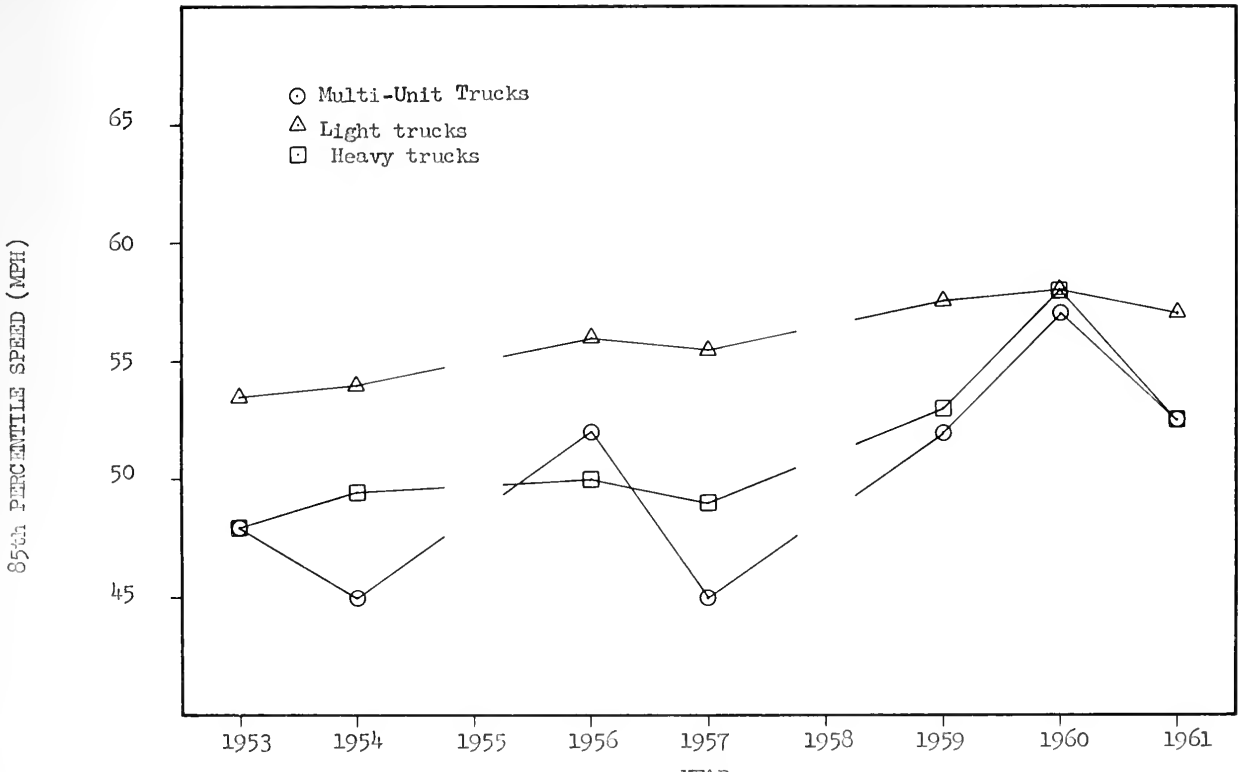

FIGURE 8. TRENDS IN THE 85th PERCENTILE TRUCK SPEED ON TWO-LANE HIGHWAYS (1953-1961)

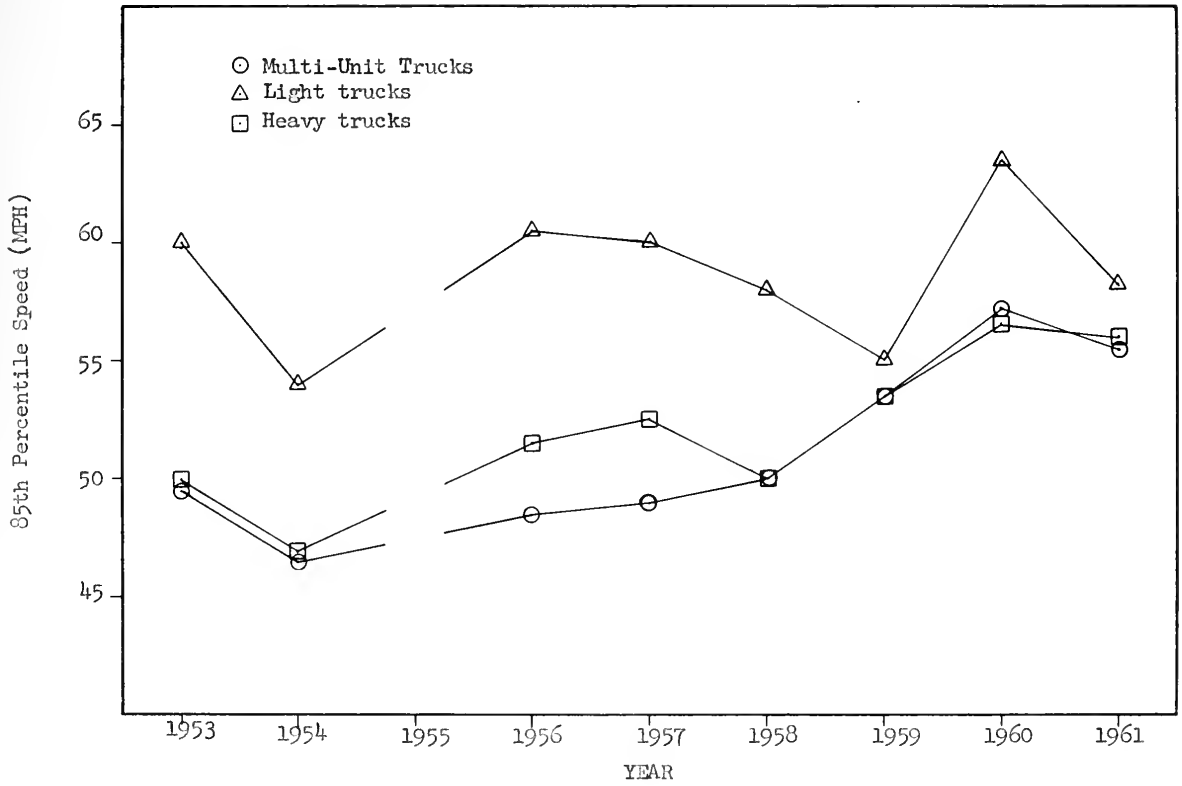

FIGURE 9. TREND IN THE 85th PERCENTILE TRUCK SPEED ON FOUR-LANE HIGHWAYS (1953-1961)